# Evaluation of Heel Pain

## Topuk Ağrısının Değerlendirilmesi

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**ABSTRACT** Heel pain is a common health problem that can be seen in both male and female population in any part of their lives. It is important to have a good history and physical examination of foot and ankle. If necessary the use of imaging techniques are essential in guiding the correct diagnosis and treatment.

**Key Words:** Heel pain; plantar fasciitis; heel spur; rehabilitation

**ÖZET** Topuk ağrıları her iki cinsiyette de hayatın herhangi bir döneminde sık karşılaştığımız bir sağlık sorunudur. Ayağın ve ayak bileğinin iyi bir anamnezi, fizik muayenesi ve gerekli durumlarda görüntüleme yöntemlerinin kullanılması doğru tanı ve tedavi yönlendirilmesinde önemlidir.

**Anahtar Kelimeler:** Topuk ağrısı; plantar fasit; kalkaneal spur; rehabilitasyon

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Heel pain is a very common foot disease that may cause significant discomfort and disability. The patient frequently complains of pain on the posterior aspect of the calcaneus at the insertion of the achilles.[1] Other less common causes of heel pain, which should be considered when symptoms are prolonged or unexplained, include osteomyelitis, bony abnormalities such as calcaneal stress fracture, or tumor. It is important that a good history and physical examination of foot and ankle, if necessary the use of imaging techniques are essential in guiding the correct diagnosis and treatment. The location of the pain can be a guide for diagnosis.

## ETIOLOGY OF HEEL PAIN

There are many causes of heel pain that can induce the mild to moderate chronic severe heel pain. Biomechanic factors are the most common etiology of heel pain. Other causes include injury related, neurologic, arthritic, infectious, neoplastic, autoimmunological, and other systemic conditions (Table 1).[2] The classification according to the affected anatomic localiza-

**TABLE 1:** Etiology of heel pain.

| Causes of plantar heel pain | Causes of posterior heel pain |
|---|---|
| Plantar fasciitis | Retrocalcaneal bursitis |
| Atrophy of heel pad | Achilles tendinopathy |
| Posttraumatic, (e.g, calcaneal fracture) | Haglund's deformity |
| Enlarged calcaneal spur | Degeneration of Achilles tendon insertion |
| Neurological conditions such as tarsal tunnel syndrome | |
| Systemic disease, (Reiter's syndrome, psoriatic arthritis) | |
| Calcaneal apophysitis | |

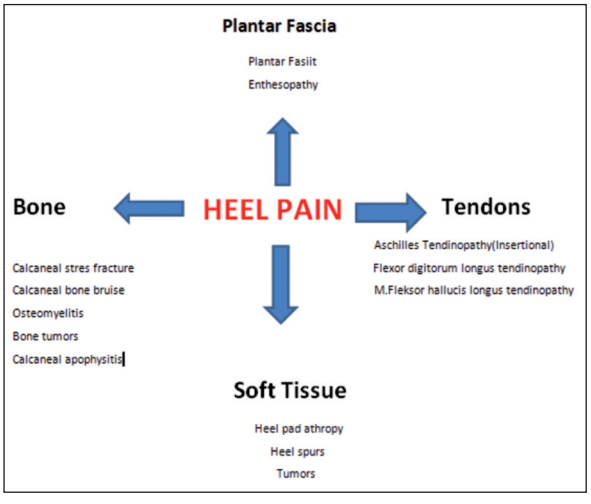


**FIGURE 1:** Classification of heel problems.

tion is shown in Figure 1. In the senior group, foot pain is associated with decreased ability to manage the daily activities, problems of imbalance, walking pattern, and increased risks of falls.[3,4] Also as a person grows older, the pads that protect the heel from injury, can lose efficacy and thus fail to provide the shock absorption.[5]

Heel pain is the most common in active people over the age of 40.[5] This increased prevalence may result from a decrease in the elasticity of the plantar fascia and a slowing of the healing process with age. Heel pain is also relatively common in active children and adolescents between the ages of 8 and 13. Athletes are also the most risk to develop pain heel conditions and it is the most frequent injury in ballet dancers.[6] Active routines such as running and jumping can put constant strain on the heel, various muscles, ligaments all over the foot, ankle, and calf, which can lead to significant tissue damage. Improper muscle flexibility, increased foot pronation, and leg length discrepancy are other predisposing factors for this condition.[7]

## PLANTAR FASCIITIS AND HEEL SPURS

Pathology of the plantar fascia may be secondary to excessive load being passed through the fascia, or excessive stretching of the fascia. Increased load may be the result of obesity, prolonged standing, or a fit individual undertaking excessive activity. This results in micro-tears within the plantar fascia that do not heal, as the primary cause continues to be provocative either in the form of increased load or continued excessive activity. The pathophysiology may be exacerbated by a tight gastro-soleus complex, which has been reported in 83% of individuals presenting with pathology of the plantar fascia.[8] Every year, about 2 million people present with plantar heel pain, with men and women affected equally.[9,10] Plantar fasciitis is the most common cause of plantar heel pain. In the begining, plantar fasciitis was considered as an inflammatory progress; later, recent studies have demonstrated a noninflammatory, degenerative process, named the term plantar fasciosis.[11] Plantar fasciitis causes medial plantar heel pain that is worse with the first few steps in the morning or after long periods of rest. The pain usually decreases after further ambulation, but can increase along the day with continued weight bearing. Pain often increases with stretching of the plantar fascia, which is achieved by passive dorsiflexion of the foot. Radiography is usually not essential but helps the diagnosis. Approximately %50 of patients with plantar fasciitis have heel spurs, but they are most often an incidental finding and do not correlate with the patient's symptoms.[12,13] Ultrasonography can demonstrate a thicker heel aponeurosis of greater than 5 mm.[12,13] Treatment of plantar fasciitis is typically conservative. First step treatment includes relative rest, stretching before initial weight bearing, strengthening exercises, analgesic medications, and ice application. The patient should be in-

structed to use a heel pad (one-half inch), arch support to reduce the stretch of the plantar fascia, or taping.[14,15] In addition, the patient should be advised not to walk barely and replace worn-out footwears. Early treatment within 6 weeks of the development of symptoms is thought to hasten recovery.[16,17] Night splints, corticosteroid injections can be used for more calcific cases.Stretching exercises of the Achilles tendon should also be recommended. The best method for performing these stretches is to lean against a wall with the forefoot while keeping the heel on the ground and knees straight.[18] Local steroid-anesthetic injection along the medial aspect of the heel often provides relief but may be associated with fat pad atrophy and is recommended in resistant cases. Steroid injections can be done using ultrasound to guide needle placement.[19,20]

Heel Spur also contributes to heel pain. When stress is put on the plantar fascia ligament, it does not cause only plantar fasciitis, but cause a heel spur to where the plantar fascia attaches to the heel bone. A heel spur is an abnormal growth of bone at the area where the plantar fascia attaches to the heel bone. It is caused by long-term stress on the plantar fascia and muscles of the foot, especially in fat and overweight people, active runners or joggers.[21] Physical therapy will help greatly to improve range of motion and keep joints mobile. Cold therapy may be used to relieve inflammation and numb pain. Heat therapy to loosen tense muscles and promote oxygen- and nutrient-rich blood flow to the affected area.

## CALCANEAL STRESS FRACTURE

Calcaneal stress fracture is the second most common stress fracture in the foot, following metatarsal stress fracture.[22] A calcaneal stress fracture is usually caused by repetitive overload to the heel. Patients often report onset of pain after an increase in weight-bearing activity or change to a harder walking surface. Examination may reveal swelling, ecchymosis and point tenderness at the fracture site is usually diagnostic for the calcaneal stress fracture. Radiography often does not initially show the fracture line, bone scans or magnetic resonance imaging may be needed. Early treatment of a calcaneal stress fracture involves decreasing activity level and if possible no weight bearing.

## ENTRAPMENT NEUROPATHY

Heel pain that is accompanied by burning, tingling, or numbness may suggest a neuropathic etiology. These symptoms most commonly indicate nerve entrapment caused by overuse, trauma, or injury from previous surgery. Affected nerves causing to plantar heel pain are typically branches of the posterior tibial nerve, including the medial plantar nerve and the lateral plantar nerve. Neuropathic heel pain is usually unilateral; therefore, underlying systemic illnesses should be considered (enthesopathies etc…) in those with bilateral pain.[23] Initial treatment of heel pain caused by nerve entrapment includes rest, ice, anti-inflammatory or analgesic medications, relief of pressure at the site of pain, and stretching exercises.[24] If a sprain, fracture or other injury has caused the trapped nerve, this underlying problem must be treated first. In rare cases, surgery may be done to release the trapped nerve.

## HEEL PAD SYNDROME

Pain from heel pad syndrome is often accompanies to plantar fasciitis. Walking barefoot or on hard surfaces exacerbates the pain. The syndrome is usually caused by inflammation, but damage to or atrophy of the heel pad can also elicit pain.[25] Decreased heel pad elasticity with aging and increasing body weight can also contribute to the condition. Treatment is aimed at decreasing pain with rest, ice, and antiinflammatory or analgesic medications.

## ACHILLES TENDINOPATHY

The Achilles tendon constitutes the distal insertion of the gastrocnemius and soleus muscles into the calcaneus. It is the inflammatory process within the tendinous insertion of the Achilles. This condition also refers to Achilles tendonitis, tenosynovitis, peritendinitis, paratenonitis (acute disease), tendinosis (chronic disease), and achillodynia.[26,27] The acute phase of Achilles tendinopathy is secondary to acute overexertion, blunt trauma, or chronic

overuse and muscle.[28] Overusing can simply mean the increase of running, jumping or plyometric exercise intensity in a very short time. The most common theories are based on physiological, biomechanical, and extrinsic properties (i.e. footwear or training types). Physiologically, the Achilles tendon is subject to poor blood supply through the synovial sheaths that surround it. This lack of blood supply can lead to the degradation of collagen fibers and inflammation.[29] The pathology is thought to be primarily one of degeneration and failure to repair microdamage. In the early phase there may be an acute inflammatory response, in particular within the paratenon, but the histology in the chronic phase is marked by the absence of inflammatory cells.[30] The condition can be insertional or within the midsubstance of the tendon, leading to posterior heel pain that is achy, is occasionally sharp, and worsens with increased activity or pressure to the area, such as from contact with shoe backing. Fluoroquinolone usage has also been shown to precipitate achilles tendinopathy, particularly in older persons.[31,32] Palpation reveals tenderness along the achilles tendon and sometimes a palpable prominence from tendon thickening. Passive dorsiflexion of the foot increases the pain. Conservative management includes decreasing activity and elevating the heel inside the shoe with a small feltpad.[33] The patient should be encouraged to perform sustained stretching exercises of the Achilles complex. Oral anti-inflammatory drugs may be prescribed, whereas steroid injections should be avoided as they may lead to rupture. Ice is used after activity. If the pain is acute and other measures have not helped, then a short-leg walking cast can be used for 10 days.[34] The most beneficial treatment of Achiles tendinopathy is eccentric exercises, which involve lengthening a muscle in response to external resistance.[35]

## SEVER DISEASE(CALCANEAL APOPHYSITIS)

Sever disease (calcaneal apophysitis) is the most common etiology of heel pain in children and adolescents, usually occurring between five and 11 years of age.[36] Bones grow quicker than the muscles and tendons in these patients. The tight achilles tendon begins to pull on its insertion site with repetitive running or jumping activities, causing microtrauma to the area. There may be swelling and tenderness around the Achilles tendon insertion site, and passive dorsiflexion may increase pain. The immediate goal of treatment is pain relief. Because symptoms generally worsen with activity, Limitation of activity especially running and jumping usually is very necessary).All strenuous, high-impact activities are discontinued during the initial phase of treatment, and heel lifts, ice massage and appropriate NSAID therapy are prescribed. This regimen is followed as soon as inflammation is decreased to a point that stretching is not painful by stretching exercises to achieve adequate dorsiflexion of the ankle joint. Orthotic devices can be prescribed after the acute inflammation has resolved to reduce the probability of recurrence. There are rarely any complications with the treatment of Sever's disease, and symptoms generally resolve within 2 weeks to 2 months.[24]

## TENDINOPATHIES

Although less common, other tendinopathies can cause heel pain. Medial heel pain may be triggered by the posterior tibialis, flexor digitorum longus, or flexor hallucis longus tendons. Lateral heel pain can originate from the peroneal tendon. Musculoskeletal ultrasonography of these tendons may aid in the diagnosis.[37]

## TARSAL TUNNEL SYNDROME

The tarsal tunnel is a fibro-osseous space formed by the flexor retinaculum, medial calcaneus, posterior talus, and medial malleolus.[38] Compression of the posterior tibial nerve most commonly occurs as it courses through this tunnel, causing neuropathic pain and numbness. Patients often report worsening of pain with standing, walking, or running, and alleviation of pain with rest or loose-fitting footwear. Physical examination may reveal a pes planus deformity, which increases tension of the nerve with weight bearing or muscle atrophy in more severe cases.[39] Electromyography and nerve conduction studies may be useful to confirm the di-

agnosis.[39] Treatment is mostly conservative, with activity modification, orthotic devices, neuromodulator medications or anti-inflammatory medications. Corticosteroid injections into the tarsal tunnel may also be beneficial.

## PHYSICAL EXAMINATIONS

The physical examination must include examination of the patient's foot at rest and in a weight-bearing posture. A visual examination of the foot may show swelling, bony deformities, bruising, and or skin tear. The examiner should palpate bony prominences and tendinous insertions close to the heel and midfoot, observing any tenderness or palpable deformity. Passive range of motion of the foot and ankle joints should be examined for evidence of restricted movement. Also the foot posture and arch formation should be visually examined while the patient is bearing weight; the physician must look for abnormal pronation or other biomechanical irregularities. Observation of the foot when the patient is walking may allow the examiner to identify gait abnormalities that provide further diagnostic evidence.

## PREVENTION

Foot problems are so common that prevention might seem as impossible as staying off your feet entirely. Preventing heel pain is much easier than treating it. Overweight would cause more stress on the heels when walking or running. Therefore, maintaining a healthy weight is the key to prevent future foot injuries. Footwear can absorb some of the stress placed on the heel, which may help protect it. Making sure that shoes fit properly and do not have worn down heels. A shoe should not be worn if a patient notices a link between a particular pair of shoes and heel pain.[40] If an individual is especially vulnerable to heel pain, he should try to rest his feet and discuss his issues with the professionals. Warming up properly before engaging in activities that may place lots of stress on the heels and making sure you have proper sports shoes for your task.[40] Avoiding going barefoot on hard surfaces, while walking or running as much as possible is also important. Lastly, varying the incline whilewalking or running on a treadmill can also help as it reduces stress on the heel.

## EXPECTED DURATION

When the correct treatment program begins, it sometimes takes 6 up to 8 weeks before the pain begins to ease. Total pain alleviation may not happen for several months.[41] The time frame for heel pain to last mostly depends on the cause. For example, heel pain that has correlation with obesity will improve gradually as the patient loses weight. Heel pain relating to a specific sporting or exercise regimen, a period of rest may bring relief. When a patient's heel is pain-free, the patient may need to modify training program to prevent reoccurrence of the pain. Most heel pain goes away after brief period of time either on its own or after treatment. Heel pain may return if a patient returns too early to previous level of exercise or sports participation.

## CONCLUCION

It is usually of mechanical origin and the most suitable approach for the clinician is to use the site of pain to diagnose the exact problem. There are many treatments options that exist when dealing with heel pain but there is lack of evidence to show which one is the most effective. As we don't know yet which treatment works best, upgrading to better, more supportive shoes should be the important first-line treatment option. Common causes of heel pain includes; Plantar Fasciitis, Heel Spur, Sever's Disease, Achilles Tendinopathy. The diagnosis is mostly based on clinical examination. Normally, the location of the pain and the absence of associated symptoms indicating a systemic disease strongly suggest the diagnosis. Imaging can assist the diagnose, however should not take place the clinician assessment. Several therapies exist including rest, ice, physical therapy, stretching, arch supports, orthotics, night splints, anti-inflammatory agents, and surgery. Almost all patients respond to conservative nonsurgical therapy.

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